BEFORE THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

COLUMBIA, SOUTH CAROLINA

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ALLOWABLE EX PARTE BRIEFING - ND-2018-19-E

Duke Energy Carolinas, LLC, and Duke Energy Progress, LLC - Request for an Allowable Ex Parte Briefing Regarding Managing Duke Energy Hydroelectric Projects

TRANSCRIPT OF ALLOWABLE PROCEEDINGS **EX PARTE BRIEFING**

COMMISSION MEMBERS PRESENT: Comer H. 'Randy' RANDALL, *Chairman*; and COMMISSIONERS John E. 'Butch' HOWARD, Elliott F. ELAM, Jr., Swain E. WHITFIELD, Thomas J. 'Tom' ERVIN, and G. O'Neal HAMILTON

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APPEARANCES:

HEATHER SHIRLEY SMITH, ESQUIRE, representing and ***Kodwo Ghartey-Tagoe*** [President, South Carolina / Duke Energy], ***Jeff Lineberger*** [Director, Water Strategy and Hydro Licensing], and ***Randy Herrin*** [Vice President, Carolinas Regulated Renewables / Duke Energy] presenting for **DUKE ENERGY CAROLINAS, LLC, AND DUKE ENERGY PROGRESS, LLC**

JENNY R. PITTMAN, ESQUIRE, representing the **SOUTH CAROLINA OFFICE OF REGULATORY STAFF**

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Please note:

- For identification of any additional referenced materials and/or links for same, please see Certification correspondence filed by the Office of Regulatory Staff.

- Inclusions/attachments to the record:
  - PowerPoint Presentation Slides (PDF)

P R O C E E D I N G S

CHAIRMAN RANDALL: Please be seated. I want to welcome everyone to this allowable ex parte, and we'll ask Mr. Melchers to read the docket, please.

MR. MELCHERS: Thank you, Mr. Chairman.

Commissioners, we're here pursuant to a Notice of Request for Allowable Ex Parte Communication Briefing. The parties requesting the briefing are Duke Energy Carolinas, LLC, and Duke Energy Progress, LLC. It is scheduled for today, July 23rd, at 10 a.m., here in the Commission hearing room. And the subject matter to be discussed today is: Managing Duke Energy Hydroelectric Projects.

Thank you, Mr. Chairman.

CHAIRMAN RANDALL: Thank you.

Ms. Pittman, I think you're next, to give us the ground rules from ORS.

MS. PITTMAN: Thank you, Mr. Chairman.

Good morning. My name is Jenny Pittman and I'm a staff attorney with the Office of Regulatory Staff, and I am here today as the designee of the Executive Director of the ORS at this allowable ex parte.

As the ORS representative, it is my duty to certify the record of this proceeding to the Chief

Clerk of the Public Service Commission within the next 72 hours and verify that this briefing was conducted in compliance with the provisions of S.C. Code Section 58-3-260(C).

The requirements of that statute are, in part, that the allowable ex parte be confined to the subject matter which has been noticed; and in this proceeding, the issue noticed was "Managing Duke Energy Hydroelectric Projects." I, therefore, ask that the Commissioners, presenters, and Staff all please refrain from discussing any matters not related to this specific topic.

Secondly, the statute prohibits any participant, Commissioners, or Commission Staff from requesting or giving any commitment, predetermination, or prediction, regarding any action by any Commissioner as to any ultimate or penultimate issue which either is or is likely to come before the Commission.

Third, I would ask that the participants, Commissioners, and Staff refrain from referencing any report, article, statute, document of any kind that are not included in today's presentation. A copy of any document which is referenced during the briefing today must be provided to me for inclusion

in the record which I will certify to Ms. Boyd.

And, last, everyone in attendance today must read, sign, and return the form which you were given at the door when you came in. This form must be signed by each attendee to certify that requirements contained in Section 58-3-260(C) have been complied with at the presentation.

I appreciate all your time and attention. Thank you, Mr. Chairman.

CHAIRMAN RANDALL: Thank you, Ms. Pittman.

Okay. Now, I think, Ms. Heather Shirley Smith, who is representing Duke Energy?

MS. SMITH: Good morning. We'd like to thank the Commission for your time this morning. And I want to note that we have three presenters here for you. We have Kodwo Ghartey-Tagoe, who is our president of South Carolina; we have Jeff Lineberger, who's our Director of Water Strategy and Hydro Licensing; and Randy Herrin, who's our Vice President of Carolinas Regulated Renewables.

We appreciate the Commission allowing us to put on a three-person panel. We commit that our presenters will not speak over one another; they will speak one at a time, so that the court reporter can capture everything that's said. And,

with that, I believe we're ready to begin.

[Reference: Presentation Slide 1]

CHAIRMAN RANDALL: Thank you.

MR. KODWO GHARTEY-TAGOE [DUKE]: Good morning, Mr. Chairman, members of the Commission. I am Kodwo Ghartey-Tagoe, president of Duke Energy in South Carolina. It is my pleasure to appear before you to talk about a subject that is important to this Commission, our customers, Duke Energy, and the great State of South Carolina.

Today, we'll look forward to discussing with you how Duke Energy Progress and Duke Energy Carolinas manage river systems with hydro resources. Looking at both Carolinas, Duke Energy currently manages 32 — and I need to flip this. As you can see, I don't have much practice [indicating].

[Reference: Presentation Slides 2-3]

Today we look forward to discussing with you how Duke Energy Progress and Duke Energy Carolinas manage river systems with hydropower resources. Duke Energy currently manages 32 hydropower reservoirs along nine river basins. Of those 32 reservoirs, 28 are Duke Energy Carolinas' assets and four are Duke Energy Progress' assets. Ten of

those Duke Energy Carolinas' lakes are all or partially located in South Carolina. Although we manage these lakes and river systems, we are licensed and regulated by the Federal Energy Regulatory Commission, or FERC.

Our company was built on hydropower. Duke Energy's history began with the Catawba Power Company in the early 1900s. Dr. W. Gill Wylie, James Buchanan Duke, and William States Lee founded the company because they believed the South's heavy dependence on agriculture was prohibiting growth of other industries. So they envisioned an integrated electric system of hydropower generating stations. They took the first big step toward this goal in 1904, when the Catawba Hydro Station in South Carolina began providing electricity to Victoria Cotton Mills in Rock Hill.

Over the next several years, the company's hydroelectric fleet continued to grow to serve not only commercial textile mills but the entire region's growing appetite for electricity. Public safety gained increased focus after the Great Flood of 1916. Back-to-back hurricanes triggered massive flooding on the Catawba, Yadkin, and French Broad Rivers, causing loss of life and property. At Duke

Energy, high-water management now became one of our priorities as we rebuilt some dams and continued to build new ones to provide additional hydropower.

We continued to grow and now have numerous forms of electricity generation, but there is something special about the systems of rivers and lakes that the company manages. Not only do they provide hydroelectric power but they also provide condenser cooling water for nuclear and fossil stations; they provide process water for industries and drinking water and recreation opportunities for millions. These river systems enhance the quality of life for those who live on or use them, and we are proud to be the company that created and manages these reservoirs.

We understand the great responsibility we have to our customers and others who are dependent upon the lakes and rivers. Our lake neighbors and users want to know we are effectively managing the river system, not only on a day-to-day basis but during extreme weather conditions, whether from drought or high water from storms. They also want to know that we are communicating effectively with them throughout an event, as their safety is our main priority.

Let me take a few moments and talk about droughts. Duke Energy shares a commitment to ensuring an abundant water supply is available to communities along the rivers. Conserving water is a shared responsibility among all water users, including individual households, particularly during drought conditions. Large water users and resource agencies worked with Duke Energy Carolinas to form the Catawba-Wateree and the Keowee-Toxaway Drought Management Advisory Groups, and with Duke Energy Progress to form the Yadkin-Pee Dee Drought Management Advisory Group. These groups implement drought protocols to reduce water use during periods of low inflow in their respective basins. These groups have agreed on the requirements set forth in their drought protocols and will reevaluate and modify them periodically.

Another priority for us is managing storm events resulting in high water on our lakes. Part of managing the river system is monitoring: monitoring lake levels and the weather. Once we determine a possible high-water event might occur, we activate our Duke Energy team, consisting of our hydro experts, meteorologists, corporate communications, and our community relations leader,

a leader who is on my team and reports directly to me. The team usually meets twice a day, every day, until the event is over. And as conditions can and often do change, they have to stay flexible in these meetings.

Once the team determines the strategy to manage the event – and you'll hear more on strategy later – we communicate externally to the public and local emergency management. Communication takes many forms during an event. Our Regulated Renewables Operations Center, our hub in Charlotte, which monitors and controls most of our operations at our dams, is in contact with county 911 centers. My community relations managers have the responsibility of ensuring local government and county emergency management officials are aware of the situation and our management strategy. I can't say enough about our appreciation for the great partnership we have with local emergency management officials and their role in monitoring public safety and taking protective action. We know how much they rely on the information we share, and we make sure they have access to us 24/7.

One of our primary goals is to drive those who might be affected by a weather event to our

website. There they can see lake levels, read our updates, which include a prediction on how high we believe their lake will go, and a safety message. We also offer an 800 number for the public to call, and several organized groups of our lake neighbors have our teams' e-mail addresses and phone numbers, so they can reach out directly to us.

We are transparent, we understand their concerns, and I believe our team does its best to manage these events. We know lake neighbors are concerned about their backyard – and I would be, too, if I lived on a lake. We try our best to help them also understand that we have to manage an entire river system, not just one lake. These hydropower reservoirs have been around a long time and their value to our company and the communities we serve continues to increase. I'd like to particularly thank the managers of the many public water systems and the local emergency management directors for their ongoing partnerships to help everyone to use these limited water resources wisely and to protect the public as we manage through challenging weather extremes.

Thank you again for allowing us the opportunity to be with you today. Now, to help you

understand how we manage our river systems, I'll turn it over to Jeff Lineberger to my right.

[Reference: Presentation Slides 4-5]

MR. JEFF LINEBERGER [DUKE]: I want to talk to you today — thank you for having us here, Mr. Chairman, and Commissioners. I'm going to talk to you today a little bit about our regulatory framework for our hydro projects, how we approach relicensing of these hydro projects, and then a little bit about one of the extremes that we have to deal with and how we go about managing that.

There are a lot of ingredients or a lot of things that go into a modern hydro-project license, and you can see the list of them up there [indicating]. Technical studies are certainly a big part of the process. You have to, basically, evaluate how your project is affecting the river and how it's affecting the community and the people that are there now, and the people that you might expect to be there decades into the future. We also have stakeholder agreements where we work with lake neighbors and other folks to help shape that future of what the license should look like. Water quality is a big issue for reservoirs, in particular, that stratify in the summer — hot water

on top, colder or lower-oxygen water in the bottom. So water quality certifications are necessary from each state that's involved, to make sure that how you're proposing to operate will meet state water quality standards. There can be endangered species. There can also be this thing called fish passage prescriptions. Basically, there's some fish species that live in the ocean part of their life and have to move to freshwater to complete their lifecycle, or vice versa, and when you have those kinds of fish species involved, you have to figure out a way to pass them around your dams; they can't do it by themselves.

FERC licenses are for a very long time – 30 to 50 years – so you really have to invest a lot in the process. The relicensing process itself is at least six years long, and it can take much longer than that sometimes.

We have relicensed, now, in the Carolinas, all of our hydro projects that have FERC licenses, except one. The one that remains is the Bad Creek Project; its license expires in 2027, so in the next couple of years we'll actually be starting that relicensing process, as well.

What we are here really to focus on today is

kind of the water-management piece of all this. There's a lot in a modern FERC license, but what you see on the board are really the things that kind of dictate the management of the water. There's a lake-level regime that is described in that license that provides bounds on us as to how high or low we can operate those lakes, and then you may have aquatic flow releases that are required for fish habitat downstream, recreation flow releases so that the community can use the river the way that they need to, recreation facilities to provide safe access is certainly a part of that license. And then you have to deal with the more extreme conditions: droughts, which it seems like we've been in a lot. And I'll talk a little more about that later. You need to have a basic expectation about how you operate when there's not enough water to go around. And then you have emergency conditions; either equipment will fail or you'll have weather extremes or other public safety situations that require some special protocols. So those are defined in the licenses.

[Reference: Presentation Slide 6]

This slide talks about Duke Energy's approach to relicensing. Hydro relicensing is a really big

deal for a hydro company. It happens once every generation. And what you're trying to do at that point is look forward to the next 30 to 50 years and determine what's going to be the best overall development for that waterway. In other words, how can you change that river as you go out into the future to make it better meet the needs.

You see a quote down at the bottom from Helen Keller. If you could wrap up our approach to relicensing, it is exactly that quote. And, in fact, we used that quote as the centerpiece for how we would set up our stakeholder teams in each river basin where we have multiple projects. You know, lots of — everybody has their own idea about how the project needs to be operated. And rather than argue over that and fight about whose use was more important, we kind of established the precedent that they were all important, so let's get all those folks at the table, figure out what is within the art of the possible, and let's figure out a way to get there. We did that by establishing stakeholder teams. And the picture you see there is actually our Keowee-Toxaway Relicensing Stakeholder Team. And we had all the various users represented: lake neighbors, downstream recreation

uses, on-lake recreation uses, municipal water systems, industry, and state and federal resource agencies obviously have a heavy role in relicensing.

For our collective hydro projects over about the last 15 years, we've had 250 stakeholders, plus, involved. That doesn't include, necessarily, all the staff from the resource agencies that were involved. Hundreds of public workshops. Most of those public workshops went all day. And our stakeholder teams were all independently facilitated by a professional facilitator who would try to drive the process not to meet Duke Energy's needs but to meet the collective needs of the people that were represented there. In many respects, the stakeholder processes we ran were absolutely public planning processes, to plan a shared resources for the future.

Sound science and engineering had to be a key component, because anything you're going to ask the Federal Energy Regulatory Commission to approve, they have to know that it is based on that sound science and it's not just what people want. All the stakeholders were involved, all were able to negotiate towards these relicensing agreements.

Most of them actually signed the agreements. In some cases, folks felt like they could go straight to FERC and get an outcome that was better for their interests, and that was certainly fine. But, in the end, what we wound up with in most cases was a stakeholder agreement that we designed our license application around, so that when FERC got it, they were basically hearing from the region that this is how the region wants FERC to issue the new license and require a little different operation than maybe we had in the past.

[Reference: Presentation Slide 7]

Okay. Reservoirs are a big part of our hydro operation. In fact, we could not operate without them. In the last 19 years, going back to 1999, 15 of those 19 years we have had below-average rainfall, below long-term average rainfall, in the Duke service areas in the Carolinas. So most of the time, over about the last two decades, we've been in a drought. And some of those droughts have been significant. In fact, two of them were the new droughts of record. We had a four-year drought from '98 through 2002; that was the new drought of record at that time. And then we had another one from '07 into early '09 that broke that one. And

you guys, you folks, know what happens when there's not enough rainfall to support all the needs. What happens is what you see there at Lake Jocassee. It's down 26 feet when that particular picture was taken. But these hydro reservoirs are a shock absorber; they help us work through periods when there's not enough rain to meet all the needs.

A big part of our relicensing process was to design a regional protocol that would basically operate on the principle that all parties that are using water, when you hit these various stages of droughts, will all cut back, will cut back in a known, planned sequence, so that we slow down the rate at which we're consuming water from the reservoirs. You can't conserve your way out of a drought; eventually, it has to start raining again to fill the lakes up. But what you can do is slow down your human uses, so you buy more time for that rainfall to come, and that's really what those drought protocols do. We've got public water utilities, industries, resource agencies, and Duke all involved there. We communicate very frequently, very often, and we follow what each other is doing to make sure everybody is doing their part. It's all about shared responsibility.

There's a lot of information on the Duke Energy website that covers our drought protocols in the river basins and it is really very helpful. From some of our post-event evaluations, the single most important thing that has happened in these river basins is the slow-inflow protocol. That's how we kept all the water intakes, for instance, in the Catawba Basin, covered in that new-record drought from '07 to early '09. It was early detection, early action, and coordinated action by all the key parties.

In a very significant way, with these new licenses, we now have a safety net there in that shared water supply that never existed before. So there are some good things that come from new regulation, and particularly when you can evaluate a shared resource together and everybody recognizes the need to do their part.

I'm going to turn it over to Randy Herrin now, and he's going to tell you about some more aspects of hydro operation.

MR. RANDY HERRIN [DUKE]: Good morning. I'm Randy Herrin; I'm the vice president of Carolina Regulated Renewables. We're responsible for the operation, maintenance, of the hydro facilities

that Duke Energy owns. We're also responsible for the FERC Owners Dam Safety Program.

[Reference: Presentation Slides 8-9]

I want to thank the Commission for the opportunity to present, this morning. As Kodwo mentioned, Duke Energy has a long history in clean hydro renewable power dating back to 1904 in the Duke Energy Carolinas company and also over 100 years of service in the Duke Energy Progress company.

Last year, 2017, we generated over 5.2 million megawatt-hours of gross generation from these facilities. There are a total of 33 facilities in both North and South Carolina, including DEC and DEP. They provide a tremendous benefit to our customers, providing flexible dispatch to support energy demand, when needed, and we operate these facilities from a central operating center in Charlotte, North Carolina.

[Reference: Presentation Slide 10]

Another important aspect of these facilities is the storage benefit that we get from them. We have two pumped storage facilities. I'm sure some of the Commissioners have heard of the pumped storage stations Bad Creek and Jocassee that are

both in South Carolina. They generate to meet peak energy demand; and during off-peak times, such as nights, weekends, or other off-peak hours, we would reverse the units and pump the water back up into the upper reservoirs to store the energy for future need, for customer demand. They provide tremendous grid support on a daily basis. One other important aspect is we have — between the two sites, we have over 2000 megawatts of both generation and pumping capacity, which I want to mention is still a tremendous benefit to our grid.

These facilities help integrate other renewables, such as solar, on a daily basis and help offset load from our generation from our coal stations, nuclear, and our gas stations.

Currently, we have in the plans to add 335 megawatts to our Bad Creek Pumped Storage Station. That project is now underway. We just completed a station outage this summer where we dewatered the reservoir to install the new main step-up transformers for the site and also do maintenance on the spherical valves, which are the main shut-off inlet valves for the site. We currently have plans to start the first unit outage in 2019, and the last unit outage will complete in 2023. And at

that time we'll have an additional 335 megawatts at Bad Creek.

[Reference: Presentation Slide 11]

So one of the, obviously, primary reasons for being here was to talk about how we manage our river operations, especially during high-water times. And just one thing to keep in mind is, every storm is different; no storm is ever the same. We use a lot of tools to help us predict what we need to do. We look at the seven-day forecast, we look at current forecasts, we look at current lake levels, we're also looking at stream inflows.

With all this information, we have to make decisions on how to generate an integrated chain of reservoirs. Based on that, we determine how to run the units, how much flow to pass in preparation for the storms. And then, as the storms materialize, we will adjust as needed. Obviously, our primary goal is to store as much of the water as possible and to systematically release it, as it materializes. You know, we do that with the goal in mind of minimizing risk to our customers, to our lake neighbors, to public recreation, so, certainly, the safety of all involved is of utmost

concern. And as Kodwo mentioned, we have many means of communicating as we materialize through these storms.

To your right on the screen, you'll notice there's a picture of — that was actually Tropical Storm Alberto, in the upper right corner. I would point but the pointer didn't work when we tried it. So that's another tool we use; we're looking at the National Weather Service tropical storm forecasting. That gives us good indications a week out, a lot of times, as to what could be impacting us, and we have to start adjusting as necessary.

One thing that's important to know is how we reference the dams. So on your left at the bottom of the screen, that is a facility that has what's called floodgates or spillway gates, and the one on the right is what we call an open spillway. The open spillway is the design of Lake Wateree Dam.

For our lakes, as I mentioned, in our operating center we're controlling 32 facilities and it's important to have a quick reference to what the water levels are, so we reference all of our lake elevation to full pond, which would be the top of the dam on the right or the top of the floodgates on the left, and we correlate that to

100.0, which is full pond.

[Reference: Presentation Slide 12]

I now want to talk a little bit about the differences of those two designs. The first is the ungated or open spillway concept, like Lake Wateree. The way that dam is designed to work is, essentially, all water that is flowing to it would pass through the units, so the units would generate based on the water that's available. During high-flow events, when you get a major storm and you can't pass the water – any more water through the units, then the water level will start to rise in that lake, to the point that it spills or goes above full pond, or 100.0. And then, also, that level can continue to rise beyond that point, just depending on how much inflow is coming in. It's considered a passive spillway. It's a very good design from that standpoint: no moving parts, no equipment to fail. It's a very safe means of passing water. Unfortunately, though, the water does rise; that's the way it's designed to work. So in the case of Lake Wateree, that dam, the water level, once it reaches full pond, if the flows continue it would spill over and the water level would continue to rise, depending on how much

inflow.

In the picture at the bottom left, that is actually Wateree Station, and it's during a high-flow event.

[Reference: Presentation Slide 13]

So, a gated facility works a little different from the standpoint we're basically managing the storage to the maximum that we can. We manage that water up to the top of the spillway gates, which is what we consider full pond. The difference is we do not allow the water to spill over the top of those gates. Basically, it creates safety issues; it can create issues with the gates' functionality. Debris would start to go over and could jam the mechanisms that work the gates. The most important feature of the floodgate is the protection of the dam. We're responsible for ensuring the integrity of the dam, and so we have to make sure the floodgates are operational. So we would operate those floodgates to handle any additional flow that would come into that reservoir.

So, if you are looking at different reservoirs on our website during a storm, you may see, you know, a Lake Wateree that reads 101.0, which means it's spilling one foot, or you may see Lake Norman

sitting at 100.0. Lake Norman is a gated spillway; Lake Wateree is an ungated spillway. So that's why you would see differences when you look at our website.

[Reference: Presentation Slide 14]

So now I want to talk just a second about the most recent storm, subtropical storm, Alberto, that came through our service territory. The USGS chart on the right illustrates that we received roughly nine inches of rain over a sixty- — six-day period. The gauge that we're looking at, Pleasant Gardens, North Carolina, is just outside Marion, North Carolina, which is Lake James, our uppermost reservoir on the Catawba-Wateree. That storm system actually followed two other significant storms that we had prior to it, in April and May, which basically already had lake levels somewhat elevated, and we were also getting a significant amount of inflow from the streams. Just for reference, in April, our basin average was 141 percent of average rainfall, and for May it was 148 percent, so both April and May had already received significant inflow.

[Reference: Presentation Slide 15]

Diving a little deeper into the actual storm,

over the five-week period that we're referencing below in this chart, we had three storms. The first storm occurred in/around April, late April, April 22nd timeframe. That was about a five-inch storm of rainfall. The blue line is Lake James, the red line is Lake Norman, and the green line is Lake Wateree. In and around May 20th, we received another storm system that came through, received about six inches of rain at that same location, Pleasant Gardens. And you can see, in the case of Lake James, it did go over full pond during that event. And then the final event, which occurred in/around late May, that is the Alberto storm system that we have circled. Lake James, the blue line, you can see how high the level went; it went up close to four feet above full pond, not quite four feet. That was the nine-inch rainstorm that we had. And in that case, Lake Wateree did spill, or go above full pond; it went slightly over one foot above full pond.

Also, one thing to note on this chart, it took about seven days for that water to move through the system, so the rain that comes in on the upper part of our system, it ultimately has to go through the last reservoir, which in this case is Lake Wateree.

So after a high-water event, we basically work — sorry.

[Reference: Presentation Slide 16]

There we go. Thank you. After the high-water event, what we do is work to get the reservoirs back to target. So, our FERC license gives us a target elevation that is the general guideline for where the reservoir should be, based on a certain part of the year. You can get that from our website, as well, when you go check lake levels. So we essentially work to move the water through the systems, through floodgates, until the water levels recede, or they will continue to spill over the spillways, as well, until the water levels recede, because, you know, just because a storm passes through, the inflows will continue from the streams and reaches for days. So it takes, you know, a — it can take a week, easily, to move the water through the system.

And as I mentioned, also, Lake Wateree, which is our last facility in the Catawba-Wateree chain, in those ten reservoirs it can take days for it to get back to normal elevation or to our target elevation.

[Reference: Presentation Slide 17]

So how have we done on Lake Wateree? So, if you look at the past 15 months of operation, you'll see that there were two other times – on your left, on the chart, you'll notice that around the end of April, the first of June, in 2017, there were two excursions where the lake went above full pond. And then, most recently, in June of this year, during Alberto, where Lake Wateree went to one foot above full pond.

We are, as a part of the comprehensive licensing agreement with the FERC for the Catawba-Wateree, we are adding additional spillway capacity to Wateree Dam of 10,000 cfs, which equates to about 400 Olympic-size swimming pools per hour of flow. So that's how much water we're talking about that we are adding the ability to move. What that will do is it will help manage the water level on Lake Wateree during some of these high-flow events. It will not prevent Lake Wateree from going above full pond, but it will help minimize some of these smaller excursions, such as the one-foot-over-full-pond excursions.

[Reference: Presentation Slide 18]

So, now, just to touch on a couple – we get a lot of questions, needless to say, from lake owners

up and down the reservoirs, North and South Carolina. So I just wanted to talk – and I've tried to touch on things to kind of illustrate a lot of this. It's a very complex – it's very complex to operate the river systems. It's not an exact science, but we use all the most exact tools that we have. When you look at – one myth is: DEC manages flooding events differently on North Carolina lakes than South Carolina. And that is – the truth of it is we manage them the same, but there are differences between dams. As I mentioned, some are gated, some are ungated spillways, that can result in water levels that appear different. You know, you may have one reservoir above full pond and one not. You've got – it depends on how much rainfall you get in any certain area. You know, just because you get nine inches of rain at Lake James, you may have only got a half an inch at Lake Wateree and it appears like, well, we really didn't get any rain, but, in fact, we got a lot of rain.

Another myth is: The lakes were designed for flood control, but DEC doesn't operate them that way. So our lakes do have some flood-control ability. We have targets that are established by

the FERC, and we operate to those targets and it provides a modest amount of storage to handle high-inflow events. It's not of the same caliber as, say, a Lake Hartwell, which the Corps of Engineers operates, which they operate at a much lower level. Our reservoirs are operated to serve many things, as Jeff mentioned in his presentation, such as water use for drinking water, recreation, lake neighbors. There's many uses. And so we manage that to a target that equates for all of that.

The last one is: DEC waits too long to begin drawing down reservoirs when storms are approaching. I hope I've tried to illustrate the complex nature of trying to manage to these different storms. And just to kind of illustrate that, I want to flip back to this previous slide.

[Reference: Presentation Slide 17]

If you'll look at the date around September, mid-September of 2017, if you see the — it's kind of in the middle of the chart. That is actually Hurricane Irma that was coming up through the Gulf and, initially, it was projected to come straight through our service territory, right up the Catawba-Wateree, so we began immediate draw-down actions on Lake Wateree. So this Lake Wateree

level, we pulled it down from 98 to 95½ feet – I'm sorry – 95.5. And in that case, the storm kept drifting left, or west, and ultimately we really got very little rain. I think we got about an inch of rain in the Upper Catawba Basin. So in that case, you know, that just shows the nature of trying to predict. I think everybody on the Commission probably understands how difficult it is to predict the weather.

And with that, I will turn it back over to Jeff Lineberger.

[Reference: Presentation Slides 19-20]

MR. JEFF LINEBERGER [DUKE]: All right. As Kodwo mentioned, these lakes have been around a long time, over 100 years. And our companies and, really, our economy and our communities have all grown up around them and grown dependent on them. And we hope another 100 years will go by, and the region is still relying on those outstanding resources.

One of the things that a stakeholder process and relicensing does is it lets you have a regional learning opportunity. And one of the things the region learned in the Catawba was that, even though there's a lot of usable storage in those 11 lakes

there, there can be times when it's not enough, and in particular, if the region continued to grow the way it was projected to grow when we were relicensing, at some time around the middle of this century, around 2050, the capacity of those lakes to support additional growth would be reached, which meant, in other words, not that water intakes would go dry but you would get to the point where you could not add significant new economic development in the Catawba Basin. Stop and think about that just for a minute. And that was arrived at using the most sound science and engineering, but you're having to do projections out 50 years, which is a long time. But it really kind of shook us all.

And we decided — and when I say "we," I mean, primarily, Duke Energy and 18 public water utilities that rely on the Catawba Lake System — we decided that we needed to do something about that, because that wasn't an acceptable alternative. And the something we decided to do was this Catawba-Wateree Water Management Group. We established a 501(c)(3) nonprofit in 2007 of Duke Energy Carolinas and the 18 water utilities that either had an intake in one of those 11 reservoirs or it

was in the river right downstream, so they relied on the storage in the reservoirs. We all agreed to pay dues, and the dues were based on, relatively, how much of that water resource you were, as an entity, using. In total, we collect $550,000 a year from the 19 members, and then we turn that money into collective investment into that shared resource. We have a five-year rolling projects list where we are trying to accomplish things that will basically let the river help us to continue to grow for further out into the future, while at the same time protecting the environment.

We've accomplished a lot with that money. We've invested over $5 million since 2007. We've completed — I think we're up to 26 technical projects now that we've completed. And to give you some examples there of what those do, they're getting at things like better use of technology and better information being provided to customers so that they can use water and energy more efficiently.

Water intake contingency plans. You know, a few of those 18 water utilities had contingency plans that thought about, "Well, what happens if my intake fails, for whatever reason? What will I do

then to meet my public safety and health requirements to provide water to the citizens?" Several of them did not. So one of the projects that the group tackled was, "Let's make sure all those water utilities have a good contingency plan, in case that really bad day happens and you can't use your water intake that's in one of these Duke Energy reservoirs."

Looking at reducing water loss from those same water utilities, from their distribution systems — again, another way so that humans are using water more efficiently — I did some evaluations and projections for how fast we're losing storage in the lake system from sedimentation and to better understand the interaction between groundwater and surface water in those lakes. Sometimes when we hit these droughts that last for months and months and months, instead of the groundwater supplying the lakes with water, you actually have a reversal there where the lake starts supplying groundwater, so that makes lake levels drop faster than can otherwise be explained. So that's one of those unusual things that happens in extremes.

And we're continuing to try to get better on our water-demand forecasting going out into the

future. The most significant thing, though, and it actually rolled up a lot of those 20-some projects, was this Water Supply Master Plan. I told you that mid-century for reaching the economic growth capability of the resource wasn't acceptable. We knew we wanted to push it out further, we wanted to push it out as far as could reasonably be expected. And the end result of about two and a half years of work, there, was to do essentially an integrated resources plan for the shared water resource in the basin that spanned the water and the electric utility industries. We were able to accomplish that, and we developed a Water Supply Master Plan that has a defined set of actions, some of which Duke Energy will take, some of which the water utilities will take. But the current projection is that, if we all implement our requirements under that plan, that we will at least be able to continue to grow through the year 2100. And we're going to update that plan at least every ten years. The next update would be due in 2025. I expect we'll update it sooner than that, to account for some of the things that have changed already since we came out with that plan. This plan is not a shelf document; it's a living, breathing process

now, and we talk about it all the time. That group meets — the entire group meets every other month, and the board meets the months in between. So it's as active and as effective an organization as I've ever been a part of. It's really been — it's been a pleasure to be involved with these folks, because we all understand that we can't make it if the river can't make it, so what we're doing is to help the river help us use it longer.

[Reference: Presentation Slide 21]

And, with that, again, we very much appreciate the opportunity to talk about where our company came from — we started as a hydro company, and it's still profoundly important to us, and we understand how important it is to the region.

If you have questions, we'll be glad to entertain them.

CHAIRMAN RANDALL: Thank you.

Commissioners, any questions?

COMMISSIONER ELAM: Mr. Chairman.

CHAIRMAN RANDALL: Commissioner Elam.

COMMISSIONER ELAM: Good morning. I guess, Mr. Herrin. You said in your presentation you were going to add 335 megawatts to Bad Creek. How do you do that?

MR. RANDY HERRIN [DUKE]: It's pretty complicated.

[Laughter]

COMMISSIONER ELAM: Well, I didn't think you could really expand the powerhouse.

MR. RANDY HERRIN [DUKE]: You're right. We are adding – replacing the turbines, so the part that turns when the water passes through, so we're putting in higher-output, more efficient turbines.

Also, we're rewinding the generators, so we're upgrading the generators. I mentioned that we had just completed a station outage to replace the main step-up transformers; we had to do that, as well, because of the additional output.

And then there are some other systems inside the plant, also, that were upgraded. But, essentially, it's through a more modern turbine design, more or less, turbine efficiency improvement.

COMMISSIONER ELAM: Okay. On one of your slides – I guess I'm on page 17 – you were talking about the lake levels and you said at one point you had drawn the lake down at 95.5.

MR. RANDY HERRIN [DUKE]: Uh-huh.

[Reference: Presentation Slide 17]

COMMISSIONER ELAM: Did that create any problems as far as shortages, at that level?

MR. RANDY HERRIN [DUKE]: You know, whenever we were watching Tropical Storm Irma, and we had to make some decisions around lake levels, the predictions we were seeing at the time were somewhere around eight to ten inches of rainfall, and so we knew we needed to make some room, so we started to aggressively pull the reservoirs down. In that case, as I mentioned, we got – I think it was, on average, less than an inch of rain in the Upper Catawba, but that was enough rainfall, along with the stream flows at that particular time, we were able to recover and get back to target pretty nicely. So in this particular case, we were able to get back to target, and that's the balance we have to work with, because we don't want to put us into a drought situation by pulling the reservoirs down preemptively and thus losing that water and not – and then when you don't get it, you can't get it back. So we have to really balance that.

COMMISSIONER ELAM: So what's sort of the breaking point of a shortage or drought problem, as far as how far down you can go?

MR. RANDY HERRIN [DUKE]: So we do have

minimum operating ranges on the reservoirs that are established by the FERC. Those are also on our websites; you can go in and look at what is deemed the operating range. Typically, we would try to stay within that range, but during, you know, severe conditions, we can deviate from that.

COMMISSIONER ELAM: Okay. Mr. Lineberger, on page seven, on your drought page, you have a bullet point at the bottom referred to as "safety net."

[Reference: Presentation Slide 7]

MR. JEFF LINEBERGER [DUKE]: Right.

COMMISSIONER ELAM: And could you kind of go through and explain the safety net, what that is and what are the parts of it?

MR. JEFF LINEBERGER [DUKE]: Yes, sir, I'll do that. The safety net is the slow-inflow protocol, itself. You know, if – we've got reservoir storage there, and if we were just focused on the Duke Energy hydro use of that reservoir storage, the dryer it gets the faster we would use it – right? – because we want to provide our electric customers with – hydropower is the cheapest resource we have. So, the dryer it gets the faster we'd use it, the more we would use hydro. What the safety net does, though, is it requires us to slow down. One of the

very first steps in the low-inflow protocol is for Duke to basically stop using its discretionary hydro generation. What we do is we meet the downstream minimum release requirements, and above that that's all we do, when we get into the later stages of the low-inflow protocol.

So that volume of water stored in the reservoirs is like a bank account, almost, for the region, and rather than continuing to use it at a rapid rate when the drought comes, the procedure says to slow down. So you're able, then, to keep some flow going downstream for a longer period of time than you would have otherwise been able to. And that's the safety net aspect. It'll keep water intakes covered downstream longer in a drought, by slowing down. It will also keep the aquatic resources with a higher level of flow.

If you took away our low-inflow protocol and you took away our reservoir storage, you know, the '07-'09 drought, there would have been sections of the Catawba River that would have been dry.

COMMISSIONER ELAM: In that bullet point, you list public drinking water, industrial water, aquatic communities, and power generation that never existed before. I think I understand the

industrial water users – you're talking about manufacturing?

MR. JEFF LINEBERGER [DUKE]: Right.

COMMISSIONER ELAM: Is the industrial farming part of that? Because I know that's been an issue that's been kicking around in South Carolina lately.

MR. JEFF LINEBERGER [DUKE]: Right.

COMMISSIONER ELAM: If you could discuss about how that fits in.

MR. JEFF LINEBERGER [DUKE]: The agricultural piece in the – for the main stem of the Catawba, there are just not many large agricultural irrigation water intakes in that section of river anymore.

COMMISSIONER ELAM: Okay.

MR. JEFF LINEBERGER [DUKE]: But we do account for agricultural demand in the total Catawba River Basin when we do these long-range plans. But there are not any large, what you would call, industrial-scale irrigation water intakes in any of these 11 reservoirs for agricultural uses.

COMMISSIONER ELAM: And "aquatic communities," you're talking about marinas?

MR. JEFF LINEBERGER [DUKE]: No, sir, I'm

talking about fish.

COMMISSIONER ELAM: Fish.

MR. JEFF LINEBERGER [DUKE]: I'm talking about fish and aquatic life in the river, downstream from the dams. They need water, obviously, all the time.

COMMISSIONER ELAM: Okay. And "power generation that never existed before"?

MR. JEFF LINEBERGER [DUKE]: Yes, and it's a safety net for power generation. We also have thermoelectric plants on these reservoirs. If you look at the hydro stations, there are 13 of those on the Catawba, and our four steam plants that are on the Catawba, that represents about 25 percent of our installed generating capacity for Duke Energy Carolinas and Duke Energy Progress, in total, in the Carolinas. So a fourth of the power we're generating is relying on that water resource. And if we were to run all that water out to support hydro generation and had to curtail generation at the larger steam plants, that wouldn't be good for Duke Energy nor our customers. So when we are providing slowing down the use of that storage, we are benefiting power generation, as well.

COMMISSIONER ELAM: Thank you.

MR. JEFF LINEBERGER [DUKE]: Yes, sir.

CHAIRMAN RANDALL: Thank you.

Commissioner Whitfield.

COMMISSIONER WHITFIELD: Thank you, Mr. Chairman.

I'd like to thank all three of you for your presentations. Very informative. Mr. Herrin, Mr. Lineberger, certainly for the technical end, the hydrology part of it, climate and geology part of it. We certainly appreciate all of that and all that you're doing. And Mr. Ghartey-Tagoe, we certainly appreciate your historical perspective of how and when the system was created and for what purpose.

But right now, I guess we're in the present day, and I want to discuss present day, where we are now and where we are, going forward. That said — and I don't care which one of you answers this, but just a couple of quick questions before I dive into some specific ones. What's your percentage of hydro, currently, in — I guess I'm going to say DEC/South Carolina, or just percentage overall if you have it, for hydro? We know it's very low, but I would just — if you could answer that.

MR. KODWO GHARTEY-TAGOE [DUKE]: Between the

two utilities, it's 10 percent.

COMMISSIONER WHITFIELD: Oh, it's that high.

MR. KODWO GHARTEY-TAGOE [DUKE]: Ten percent.

COMMISSIONER WHITFIELD: DEC and DEP?

MR. KODWO GHARTEY-TAGOE [DUKE]: Correct.

COMMISSIONER WHITFIELD: For both Carolinas.

MR. KODWO GHARTEY-TAGOE [DUKE]: Correct.

COMMISSIONER WHITFIELD: Okay. That said, if you could go to page three on your –

[Reference: Presentation Slide 3]

All of those river systems flow back through South Carolina, even the ones that aren't in our State, with the exception of the mountain area – and I think we can agree on that's across the Continental Divide. But I want to focus on the ones that are in South Carolina, if you can answer these questions – and I know you had some discussion about the FERC license. Could you tell us when each one of these were – the date they were relicensed, and whether it's a 30-year license or longer, from FERC?

MR. JEFF LINEBERGER [DUKE]: Commissioner, I'll try to cover that. If you start over on the left, the Bad Creek Project is still on its original license. It was licensed in 1977. That

license is for 50 years; it expires in 2027. And the relicensing process, the regulatory window is a minimum of five and a half years long. So, at least five and a half years before that license expiration date, you have to be in the regulatory process.

COMMISSIONER WHITFIELD: Certainly.

MR. JEFF LINEBERGER [DUKE]: So you really need to be doing your planning and a lot of your communication before that, but that's just a general statement. Keowee-Toxaway, that has Lake Keowee and Lake Jocassee in it; it was relicensed — the new license was issued in August of 2016, and it's for 30 years. The — let's see.

COMMISSIONER WHITFIELD: Excuse me. What year was that, again?

MR. JEFF LINEBERGER [DUKE]: 2016, yes, sir, and it's for 30 years.

COMMISSIONER WHITFIELD: Okay.

MR. JEFF LINEBERGER [DUKE]: Okay. We don't actually have the little icons on there for both of the projects. There's the 99 Islands Project, which is about where you see the Broad River arrow pointing. There's another one on the Broad River just upstream of there, called Gaston Shoals. That

hydro station – Gaston Shoals Hydro is in South Carolina, but the reservoir extends on up into North Carolina; it's one of those that's shared. Both of those were relicensed in 1996 for 40 years, so they expire in 2036.

You move on to the right, you'll see Catawba-Wateree. And as we've talked about, it has 11 reservoirs, some in North Carolina, some in South. Lake Wylie is in the middle there, and it straddles the Carolinas. That license – or, it was relicensed in 2015 for 40 years, so it expires in 2055.

And that's all of the ones that actually have facilities in South Carolina.

COMMISSIONER WHITFIELD: In South Carolina.

MR. JEFF LINEBERGER [DUKE]: Yes, sir.

COMMISSIONER WHITFIELD: That's good enough, certainly. Appreciate your answers on that.

Based on your answer, Mr. Ghartey-Tagoe, with being 10 percent – I know several years ago I saw some numbers on some of the Duke hydro, and I know some of the ones were phased out on a long list you had in the IRP, like Buzzards Roost, places like that, were sold off, what have you. That number is a little bit higher, considering renewables being a

big word this day. I'm a little bit surprised it's that high – and glad to hear it, actually. But would you say, for your purposes – of course, 10 percent's, again, a bigger number than I was expecting. But would you say a lot of your hydro is for emergency purposes? Or to meet peak? Could you define or split those out as far as generation needs? Or is it for both?

MR. KODWO GHARTEY-TAGOE [DUKE]: I'd say both. I'd call on Jeff or Randy to –

MR. RANDY HERRIN [DUKE]: Yeah, so, certainly, on a daily basis, the facilities are meeting peak demand. They run at a capacity factor, you know, around mid-20s, 20 percent range, in that range. Mid- to low 20s. So we're not – you know, we're not blessed with a lot of water, or, you know, inflows. So they're, on a daily basis, meeting the peak demand. They also do provide emergency response to the grid. They do provide black-start at many of our sites, so if there's a system emergency on the grid, we can restore the grid working through our hydro facilities.

COMMISSIONER WHITFIELD: As far as age goes, you described the dam in Rock Hill around 2004, so certainly in terms of seniority, I would say you're

talking about that would be the oldest, probably with Lake Wateree Hydro Station being possibly the second oldest in that system?

MR. RANDY HERRIN [DUKE]: Actually, Lake Wylie, that dam was replaced during the – after the Great Flood of 1916. We rebuilt the powerhouse, so the new facility is called Wylie Hydro. And we totally rebuilt the dam; it's taller than it was originally in 1904. So that facility now is a 1925.

On the Catawba-Wateree, Lookout Shoals, which is in North Carolina, is – the oldest?

MR. JEFF LINEBERGER [DUKE]: So, Lookout Shoals is the oldest in North Carolina. The oldest in South Carolina is Great Falls, completed in 1907. Wateree was completed, I believe, in 1919. So, the 19-teens and '20s were big hydro construction years, lots of places in the Southeast.

COMMISSIONER WHITFIELD: And thank you for that. I certainly appreciate his original statement on the history of this, as well. And that gives us some perspective, but, again, back to today. If you could, just for a second, shift to page 15, and then I want to go to page 12 and I

think we'll about wrap up here.

[Reference: Presentation Slide 15]

On page 15, your green graph shows Wateree over — the part you have circled — shows Wateree over full pool, 100.0. It also shows Lake James, I believe, at full pool, as well. And when you see that point at Lake James, of course, that exceeded full pool very sharply, but it also comes down very sharply. And I think what is concerning, on Wateree, is how long it takes — and I think you mentioned, Mr. Lineberger, in your presentation, that particular one was about seven or eight days, I believe you said. And during that time, a lot of things happen, which I'm sure you're aware of. And I'm talking about destruction of property and all kind of damage: homes, properties, docks, debris that's harmful. All kind of things happening there. My question to you would be — and I did hear you say, and I was encouraged to hear you say that you are adding to the ability to flow through more water, faster, at Wateree, and you used the analogy of some pools. But questions along these lines are: How much would gates or locks cost for a dam like Wateree, like you have in the other 11 reservoirs, going upstream — and I know you have

Fishing Creek, Cedar Creek at Great Falls, you have Great Falls. And all those, you seem to open and mechanically operate very well, but at Wateree there is no way to let it out. And what you show on page – and I'm just going to refer to page 12. What you showed on page 12 continues for quite some time, until things get back to normal. And I guess my question is, if you had gates or locks, couldn't you better effectively manage the timing and generate – as you said, that water is money in the bank. Couldn't you effectively generate electricity more to your control, if you had gates or locks there? And I realize this is an old dam, but I'd certainly love to hear your thoughts and answers to that.

MR. RANDY HERRIN [DUKE]: Sure. Certainly, I wouldn't say that it would give us any additional generation. I mean, you know, the current design of Wateree allows for that pool to go to full pond and even over. We're generating the whole time that water is above full pond, so we're generating every unit at maximum output throughout the storm. So we're doing everything –

COMMISSIONER WHITFIELD: You're generating – not to interr- – you're generating the whole time

it's going, but you're still –

MR. RANDY HERRIN [DUKE]: And –

COMMISSIONER WHITFIELD: – still letting money flow out of the bank that you're not generating; is that not correct?

MR. RANDY HERRIN [DUKE]: Well, but if your question is adding gates – if we added gates, like you're referring to it, to gain additional storage, it would raise the lake, and we can't raise the lake because then we'd be in the same situation we're in with the water level when it spills over. You know, if we raise the lake a foot or two or three, it's going to be an issue with lake owners. So, the footprint of the lake, full pond, is – or, on Lake Wateree, elevation 225.5 is the project boundary, so that's as high as the lake, you know, can be from a design perspective. We're adding floodgates or additional spillway capacity of 10,000 cubic feet per second, is what's required in the license. We are currently evaluating how to do that, what is the most economically feasible way to install that capacity –

COMMISSIONER WHITFIELD: I was going to ask that question.

MR. RANDY HERRIN [DUKE]: – so we haven't

actually nailed that down yet. We're currently in the very early stages of that design. As Mr. Lineberger mentioned, we just received the license in 2015 for Catawba-Wateree and it was under appeal for a year. We just exhausted the appeal process, March of 20- – this year. So we are – now we're on go to do the project, and so we're just starting the process.

It's a very complex project. We want to design it to, obviously, you know, meet the needs of our customers, minimize the costs, to protect lake owners, so we'll be evaluating that over the next, probably, year, just to determine what's the most feasible way to do that.

COMMISSIONER WHITFIELD: And from an engineering standpoint – that's what I was going to ask – without raising the lake levels, other than what you're looking at now, is there no other way to put some type of gate or control – and I don't know exactly where you're going with this –

MR. RANDY HERRIN [DUKE]: We – you could add another powerhouse, another generating asset to the lake, put it on the opposite bank – would be one means. But, you know, just from our – we've actually looked at that, at a very high level,

preliminary high-level analysis, and the cost was just cost-prohibitive for the amount of power that we'd get out, because we've still got the existing facility that can manage the flow and generate the power, you know, 99.9 percent of the time. So it would be additional capacity that wouldn't — there's not sufficient water to support it, except on — if you look at the chart —

[Reference: Presentation Slide 17]

If you look at page 17, for example, you know, there were three excursions where, basically, you know, having that additional generation would have paid off. Currently, our plan is to do it through some type of spillway enhancements.

COMMISSIONER WHITFIELD: Certainly, Mr. Herrin, and that's where I was going, in terms of generation that would benefit Duke DEC ratepayers. As you well know, most of the lake owners are not DEC ratepayers. Some are, but most are not, and aren't customers of yours. But, certainly, you can certainly recognize the PR issue that Duke has when these things happen, and I'm sure you're well aware of that, but I wanted to stick to the generation. And I certainly appreciate your answers, and certainly hope that something will be done soon and

that you can come back to us and tell us when you – very soon, hopefully – what's your direction you're going to go in, because that's been a long – I just think it would be beneficial to the ratepayers, as well as the citizens. And I certainly appreciate your answers and look forward to seeing what you come up with. Thank you.

Thank you, Mr. Chairman.

CHAIRMAN RANDALL: Thank you.

Commissioner Hamilton.

COMMISSIONER HAMILTON: Thank you, Mr. Chairman.

Gentlemen, I've enjoyed your discussion and your presentation. I wanted to move, if you could, back to page three. Mr. Lineberger, probably we'll start with you, but I've heard little about the Yadkin-Pee Dee today, and of course that's very important to me. For many years, I was involved in the area in industrial development, and we were always concerned about the water level getting across the South Carolina line, and because of the industry that we've been able to put on the Pee Dee. Tell me a little bit about – we haven't heard much about it today.

MR. JEFF LINEBERGER [DUKE]: Yes, sir. And

that's not by design. Our assets on the Yadkin-Pee Dee are just as important to us. We do have a new license over there, as well, that has a higher continuous minimum flow requirement in it, and it basically requires us to run one of our hydro units at Blewett Falls all the time, and sometimes to run more than one.

We also have a low-inflow protocol over there that provides some direction for those inevitable times of drought. So from the standpoint of water passing into South Carolina, it's another place where this low-inflow protocol and new license has given a safety net to the folks downstream that need that water. And I'm sure you probably recall how things were in the '98-'02 drought over there, and that was tough. It was tough times. There wasn't a whole lot of coordination with the Alcoa Projects upstream. And we, through the relicensing process and the approach that's been taken there, that coordination is there now. That low-inflow protocol gives the direction to the operator of those four upstream hydros, as well. So it's another place where the outcome has been very positive.

You can still get into droughts where you just

don't have enough water to ever make it work. You know, if it stops raining, we all are in bad shape. But I feel confident that we're in a good place for all interests on that river now, a much better place than we were.

COMMISSIONER HAMILTON: Okay. Thank you sir, very much. I appreciate hearing that.

Thank you, Mr. Chairman.

CHAIRMAN RANDALL: Thank you, sir.

Commissioner Howard.

COMMISSIONER HOWARD: Good morning. I, too, enjoyed your presentation. I live on a lake. A couple of these questions might be parochial. But do you have other candidates – you talked about raising your megawatts at one of your plants. Are there any other plants a candidate for raising megawatts?

MR. RANDY HERRIN [DUKE]: Yeah. The site that I mentioned, which is in South Carolina, is –

[Reference: Presentation Slide 10]

– the Bad Creek Station where we're going to raise it 335 megawatts. Jocassee Station, which is downstream of Bad Creek, we've already taken advantage of upgrading those units. We've added 100 megawatts at those sites – I'm sorry, let me

back up. I believe it was 80 megawatts of generation, 100 megawatts of pumping capacity. We've also upgraded many of these facilities over the last 20 years, specifically up and down the Catawba-Wateree River System.

There are still some limited opportunities, but we've just about exhausted most of them. Most of the sites in South Carolina have already been through the upgrades.

COMMISSIONER HOWARD: I'm relying on my memory, which is pretty weak, but several years ago when we first came on the Commission, SCE&G had — I don't know what they — I'll call it re-strengthening or they redid their dam. It was a big project.

MR. RANDY HERRIN [DUKE]: Yeah.

COMMISSIONER HOWARD: And in my mind, it was something like to make the earthquake-proof better, or something. Are any dams — was that a FERC requirement? And I'm sure it was, but do all your dams meet that requirement?

MR. RANDY HERRIN [DUKE]: You're correct, it was a FERC requirement. It was called a seismic stability analysis. It showed some of our dams needed to be strengthened or remediated. In

particular, Wateree Dam has already been done. That was done back in the 2000s. So Wateree has been done.

We currently have three dams that still remain to be done in that program. We are working on one of those right now. It's on the Lake James impoundment; it's called Linville Dam. That project is underway. Once we complete that, we have Lake Lookout Dam which follows, and then Mountain Island Dam after that. And that will complete that program.

COMMISSIONER HOWARD: Is there a timeline on that? Did FERC put a timeline on it?

MR. RANDY HERRIN [DUKE]: There is a timeline. We work them in series, so once we complete one we move to the other. And I could not quote you the end date off the top of my head, without sitting down and looking at a calendar and going through it.

COMMISSIONER HOWARD: As a lakefront owner, it's some concern to me, but there's conversation about the utilities – and, in my case, Santee Cooper – in your situation lowering the lake level by design in the winter, to eliminate winter storms, and also a sideline is to give property

owners a chance to fix seawalls and docks. In looking at your page 17, your lowest levels were during the winter. Is this any truth to that, or any –

[Reference: Presentation Slide 17]

MR. RANDY HERRIN [DUKE]: Our reservoir levels do have target elevations that typically go down towards the winter months. You know, we get less storm – less inflow in the fall and early winter, and so, essentially, we're using storage as we work our way down, and we typically work that down, and so we have different target elevations for different seasonal times of year. And then, as you start a new year, you start getting into the spring, that's our heavy inflow time, so we try to have the reservoirs in a position to absorb that inflow during that period of time.

But, now, we will do planned draw-downs at times. It could be maintenance that we need to do on a unit and, if we're going to do maintenance then we need to do a planned draw-down, then typically we would announce that to the lake owners so that they could take advantage of that time, as well, if they need to do maintenance. But it's not that we systematically pull down every, you know,

winter for maintenance. It's a seasonal thing, based on inflow.

COMMISSIONER HOWARD: What role, if any, does evaporation play in your planning process?

MR. JEFF LINEBERGER [DUKE]: Want me to cover that?

MR. RANDY HERRIN [DUKE]: [Indicating.]

MR. JEFF LINEBERGER [DUKE]: For the Catawba system, it's significant. On a hot summer day, the total surface area, full pond, of those 11 reservoirs is about 80,000 acres on the Catawba. On a hot summer day, the natural evaporation can be over 300 million gallons a day from that combined lake surface, which is more water than is used by all of Duke Energy's thermal plants and the 18 public water utilities – more water than is consumed by them, combined. So we have to plan for evaporation. And we've done that in the long-range water supply planning, and we have also considered climate change there, because if it gets hotter in future decades, that's just going to increase that natural evaporation.

It is a significant water demand and, in many cases, it's the highest water demand when you're modeling total water quantity in that reservoir

system. It's a big deal.

COMMISSIONER HOWARD: Thank you, very much. And, again, I enjoyed your presentations.

MR. JEFF LINEBERGER [DUKE]: Thank you, sir.

CHAIRMAN RANDALL: Commissioner Ervin.

COMMISSIONER ERVIN: Thank you, Mr. Chairman.

Gentlemen, thank you for being with us this morning and for your informative presentation. Where are the geothermal plants located? I believe you said you had a couple in the system. Do you know where they're –

MR. JEFF LINEBERGER [DUKE]: I think that – I probably said "geothermal"; I meant thermoelectric.

COMMISSIONER ERVIN: Thermoelectric.

MR. JEFF LINEBERGER [DUKE]: That's our steam plants. That's – on the Catawba, it's Marshall Steam Station, Catawba Nuclear, McGuire Nuclear, and Allen Steam Station. Yes, sir, that's what I was referring to.

COMMISSIONER ERVIN: The other thing I wanted to ask about: You said at certain times, when lake levels are low, that there's some seepage of the lake into groundwater. Do you know what percent we lose to groundwater?

MR. JEFF LINEBERGER [DUKE]: I don't know what

percent. I know it's erratic, as well, and the time that we really saw that was in that four-year-long drought from '98 into 2002. When you started accounting for all the known demands on the water, we were losing water at a greater rate, and the only place left is that interface with the groundwater.

COMMISSIONER ERVIN: Do you all coordinate with South Carolina Water Resources, or any other State agency, as it relates to your operation.

MR. JEFF LINEBERGER [DUKE]: Yes, sir, we do. South Carolina Department of Natural Resources is heavily involved in our relicensing process. They participate on our drought management advisory groups, and they also have been a partner for the Catawba-Wateree Water Management Group, helping us fund things like that Water Supply Master Plan. They're right there with us.

COMMISSIONER ERVIN: You mentioned the problem with sediment taking away capacity. Is there any effort or attempt with you or with any of your partners to monitor and try to mitigate sediment into the lake system?

MR. JEFF LINEBERGER [DUKE]: The answer is yes to both. We have — we did a monitoring project, if

I remember right, on six of the reservoirs a few years ago with the Catawba-Wateree Water Management Group. It was a five-year evaluation of sedimentation rates at major tributaries. We plan to do that again in about five more years.

We also have a project going on right now that is jointly funded between the Water Management Group and the Water Research Foundation, which is a national organization, that is evaluating the impact on sedimentation rates, on water quantity, and quality, of conserving targeted additional lands in the Catawba Basin. So it's — again, we're all about science. You have to — if you're going to make big investments, you have to have some good idea that it's actually going to work. But what we're doing there is trying to identify just how much of an impact would it be? How much of a benefit would it be? And we've got the land conservation community right there working with us on the project. So, hopefully, in the end, we're going to identify some places that, if we focus some resources on them and got them conserved, that it would slow down that sedimentation rate.

COMMISSIONER ERVIN: I commend your efforts on that, and I know around some of the lakes,

particularly with new construction, there seems to be a lot of sediment runoff that's not being monitored. I don't know – it's probably not your responsibility until it crosses your right-of-way, but is there any coordination with county government in terms of that, to monitor?

MR. JEFF LINEBERGER [DUKE]: There is. Our Lake Services staff, anything that crosses into that FERC project boundary, we have to issue a permit for it. So we have permitting programs that we manage. Lake Services representatives manage those. And they coordinate with either the county that has the buffer ordinances or, in some cases, those buffer ordinances are managed by the State. So when we see violations of a buffer ordinance, we work with those entities, whoever the entity is that has the regulatory authority, to try to address that. And in some cases we have required, where there was a significant influx of sedimentation from a construction project, we've required the entity that was doing the construction to get that sediment out of the lake, but there has to be a mechanism for us to do that. So if the – wherever the sedimentation came from, if they also had to have a lake-use permit from us, then that's

the mechanism that we would use to correct the problem.

COMMISSIONER ERVIN: Very good. Finally, you mentioned there are some targets that you maybe have considered or evaluated to add to the hydro capacity. Do you still own the one up in my area near, I think it's – it's between Honea Path and Greenville County. It's an old hydro plant there on the Saluda River.

MR. JEFF LINEBERGER [DUKE]: That's probably the Saluda Hydro –

COMMISSIONER ERVIN: Yes, sir.

MR. JEFF LINEBERGER [DUKE]: – Station. No, sir, we sold that in 1996 or '97.

COMMISSIONER ERVIN: So it's no longer in use?

MR. JEFF LINEBERGER [DUKE]: That's correct.

COMMISSIONER ERVIN: It's just – Buzzards Roost was sold down there in Laurens County, too, I believe, wasn't it?

MR. JEFF LINEBERGER [DUKE]: Yes, now, we actually had Buzzards Roost Hydro Station leased. Greenwood County owned it, but we were leasing it from them, and we no longer lease that.

COMMISSIONER ERVIN: Is it in your capacity now, or is it being utilized by someone?

MR. JEFF LINEBERGER [DUKE]: Santee Cooper.

COMMISSIONER ERVIN: Santee Cooper.

MR. JEFF LINEBERGER [DUKE]: Yes, sir.

COMMISSIONER ERVIN: Thank you.

CHAIRMAN RANDALL: Is that all, Commissioner?

COMMISSIONER ERVIN: Yes, sir.

CHAIRMAN RANDALL: Commissioner Whitfield, I think you said you had one more short question.

COMMISSIONER WHITFIELD: I do. I do have a follow-up for you, Mr. Lineberger, and I think it was you, and I meant to ask you this earlier. You had mentioned that, when the rainfall – a lot – the rainfall occurs up in the North Carolina area, even above Charlotte, and then, of course, may not even have little if maybe none, no rainfall down around the Catawba-Wateree area, and yet you feel the effects, obviously, because it's downstream. In the interim, from what you've suggested that you're looking into at the Wateree Dam, in the interim, is it possible that the company could pay special attention to the gates and locks above, like, Great Falls, Fishing Creek, and possibly staying on top of those, to mitigate what happens at Wateree as things come downstream, for lack of a better word, from Charlotte and north of Charlotte? And I know

you talk about one day of damage, but nobody wants one day of damage. But when there's seven or eight days, people say, "Well you're already wet." Well, no, prolonged water damage, as you know, makes things a lot worse. And I just wonder if there's anything you could do about your gate management in those upstream locks and dams, particularly the ones right above Wateree and maybe even on upstream further up the Catawba System. Is there anything you might offer there?

MR. RANDY HERRIN [DUKE]: Yeah, I think I'm the one who mentioned that, previously.

COMMISSIONER WHITFIELD: Yes, sir, I believe you were.

MR. RANDY HERRIN [DUKE]: Yes, I tried to illustrate that we do take advantage of all storage when we're in the high-flow events.

[Reference: Presentation Slide 15]

So, if you look at Slide No. 15, you know, what this illustrates – and we just picked two reservoirs. We picked Lake Norman and we picked Lake James. But what it shows is, in those cases, we're taking advantage of the storage on Lake Norman. Lake Norman is our largest reservoir. It is the biggest buffer that we have for, basically,

helping us manage high-water or flood situations. It's also our largest for managing drought situations. So, you know, that reservoir's a tremendous asset for all of us.

And we essentially use all storage available to minimize that impact on Lake Wateree. So, you know, we will attempt to have the reservoirs in the right positions, as I mentioned earlier. We will do advance drawdowns, if necessary, to make room in a reservoir, so that we can gain additional runoff during storm systems. Here again, that's predictive, so, you know, it's not an exact science, because we don't know exactly what the weather is going to do, but we attempt to, you know, make adjustments accordingly.

So we are currently using all available storage with those gated facilities. It just appears like, you know, to the folks on Lake Wateree – you know, they are seeing the same flow plus additional flow, because you've got the Fishing Creek tributary that's coming in beyond the Fishing Creek reservoir, so that's coming as well. Rocky Creek is coming into the Wateree also. So you've got those additional tributaries downstream of Fishing Creek.

COMMISSIONER WHITFIELD: As you have Lake Wylie and Lake Norman properly released, for lack of a better word, how much leeway do you have in the Catawba River – and I'm speaking specifically of Fishing Creek and Great Falls – to mitigate? Once those lakes are under control, for lack of a better word, how much leeway or elastic do you have in the – because you've got a long river system there for a while. Is there –

MR. RANDY HERRIN [DUKE]: Yeah. Well, like we say, we've got 11 reservoirs. All the water's going to wind up – you know, it winds up at Lake Wateree, eventually. As far as – you talking about travel time? How long it takes to –

COMMISSIONER WHITFIELD: Yeah, well, it looks like if you close Fishing Creek quick enough that that mitigates it. I mean, I'm –

MR. RANDY HERRIN [DUKE]: Well, but, you know, Fishing Creek's a gated facility, and 100.0 is full pond, and it can't go above full pond because it is gated and we have to maintain those gates as operational. So we can't have debris going over them that jams up the floodgate system to where they don't work, or then we don't have an operating – or, the dam is not operating properly. It's

critically important that we operate those dams in accordance with the FERC regulations, from a dam-safety standpoint, because we don't want to put the dam at risk.

COMMISSIONER WHITFIELD: Certainly. Well, I certainly appreciate your presentation.

Thank you, Mr. Chairman.

CHAIRMAN RANDALL: Thank you.

Mr. Melchers, I think you had a question.

MR. MELCHERS: Thank you, Mr. Chairman.

You've talked about the central operations hub in Charlotte and how that allows you to coordinate, particularly in significant rain events, the flow of the water for safety, and such. As you sell hydro assets, what type of control do you retain in regard to coordination of assets that you no longer own?

MR. RANDY HERRIN [DUKE]: So, the facilities that we sell, we do not retain control of the water levels, the flow rates, or any aspects of it. If you're referring to the facilities that we do have for sale currently, we are – two of them are in – actually, one is in South Carolina, Gaston Shoals, and the other facilities are all in North Carolina: Mission, Bryson, Franklin, and Tuxedo Station.

So we would not maintain control of the water above or at those facilities. Gaston Shoals does, and Tuxedo, basically discharge down the Green River, down the Broad River, to 99 Islands Station. But 99 Islands is one of the few run-of-the-river sites that we have. Pretty much, the Broad River, you know, as far as the amount of water in it and the size of those stations, there's typically always units running at those facilities, so that water will continue to come to them for generation.

MR. MELCHERS: Thank you.

CHAIRMAN RANDALL: Thank you.

Thank you, gentlemen. One quick question from me. You were talking about water temperature, evaporation, you know, monitoring, with climate change. I know a few years back, warm water in Lake Wylie caused a lot of buildup growth of stuff in the intakes at the Catawba Plant. Does the warmth and managing lake-water temperature — well, you can't manage lake-water temperatures. But does that make — do you have — does that present more of a challenge as far as maintenance of what you've got intakes on, especially on your steam plants?

MR. JEFF LINEBERGER [DUKE]: Yes, sir, it does. What you're talking about, primarily, is

algae blooms. We do see more of those in the summers that are hot, and particularly dry summers. It does require some additional work, particularly where we have cooling towers, like Catawba. We provide a biocide in that cooling water that helps reduce the buildup of growth on the heat-exchange surfaces, but it can cause greater impacts there. It can also cause impacts for the water utilities. A lot of these algaes, particularly when they die, the raw water comes in through the lake, it's processed at the water treatment facilities, but taste and odor issues on the back end can be a problem for those folks, requiring some chemistry changes in their process.

One of the areas that the Water Management Group is focusing on now – we've spent, really, the first ten years of our collective effort on quantity, primarily. We're now shifting that a little bit to look harder at quality. And we've got a water quality update to the Water Supply Master Plan that's in the works right now, that looks at things like algae blooms and like other contaminants that may get into the lake system: Are we doing enough together to monitor for those and to help our folks that live and use the lakes to

not do things that would perhaps introduce those things: things like being smarter about how you fertilize in areas that are close to the water body? Be careful with that stuff, and understand that any chemical applied the wrong way in the watershed can eventually be a problem in the lake.

CHAIRMAN RANDALL: Thank you. Gentlemen, I appreciate you being here today. Thank you for a very informative presentation.

Ms. Shirley Smith, have you got anything else?

MS. SMITH: No, sir.

CHAIRMAN RANDALL: Ms. Pittman?

MS. PITTMAN: Real brief, I just appreciative everybody following the rules today, and I would ask all the attendees to please submit their verification forms before leaving today.

CHAIRMAN RANDALL: Thank you, ma'am. Please do that.

If there's nothing else, we're adjourned. Thank you.

[WHEREUPON, at 11:38 a.m., the proceedings in the above-entitled matter were adjourned.]

C E R T I F I C A T E

I, Jo Elizabeth M. Wheat, CVR-CM-GNSC, do hereby certify that the foregoing is, to the best of my skill and ability, a true and correct transcript of all the proceedings had in an Allowable Ex Parte Proceeding held before THE PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA in Columbia, South Carolina, according to my verbatim record of same.

IN WITNESS WHEREOF, I have hereunto set my hand, on this the 24th day of July, 2018.

Jo Elizabeth M. Wheat, CVR-CM/M-GNSC
Hearings Reporter, PSC/SC
My Commission Expires: January 27, 2021.